

WHAT IS CLAIMED IS:

1. A dynamic micro-structured reflector comprising:
a substrate having a generally planar major surface; and
a plurality of cavities on the planar major surface, each cavity having at least a first and second sidewalls set at an angle offset from the planar major surface, the first sidewall being a stationary optical face and the second sidewall being a dynamic optical face, the dynamic optical face being deflectable between a first position and a second position;
wherein, the dynamic optical face in the first position redirects more light back to a light source than the dynamic optical face in the second position.
2. The dynamic micro-structured reflector according to claim 1, wherein the dynamic optical face is electrostatically actuated between the first position and the second position.
3. The dynamic micro-structured reflector according to claim 1, wherein substantially the entire dynamic optical face deflects between the first position and the second position.
4. The dynamic micro-structured reflector according to claim 1, wherein each cavity has a depth of 10 microns to 100 microns.

5. The dynamic micro-structured reflector according to claim 1, wherein each cavity has a depth of 30 microns to 50 microns.

6. The dynamic micro-structured reflector according to claim 1, wherein the cavity is a cube-corner structure having two stationary optical faces and one dynamic optical face.

7. The dynamic micro-structured reflector according to claim 1, wherein the each dynamic optical face is electrically coupled together.

8. A dynamic micro-structured reflector comprising:

a plurality of cube-corner elements forming a cube-corner array, each cube-corner element having two stationary optical faces and one dynamic optical face, the dynamic optical face being deflectable between a first position and a second position,

wherein, the dynamic optical face in the first position redirects more light back to a light source than the dynamic optical face in the second position.

9. The dynamic micro-structured reflector according to claim 8, wherein the dynamic optical face is electrostatically actuated between the second position and the first position.

10. The dynamic micro-structured reflector according to claim 8, wherein substantially the entire dynamic optical face deflects between the first position and the second position.

11. The dynamic micro-structured reflector according to claim 8, wherein each cube-corner element has a depth of 10 microns to 100 microns.

12. The dynamic micro-structured reflector according to claim 8, wherein each cube-corner element has a depth of 30 microns to 50 microns.

13. The dynamic micro-structured reflector according to claim 8, wherein the cube-corner array is formed in a planar substrate.

14. A method of making a dynamic micro-structured reflector comprising the steps of:

depositing a first conducting layer on a substrate having a generally planar major surface and a plurality of cavities on the planar major surface, each cavity having at least a first and second sidewalls set at an angle offset from the planar major surface,

patterning the first conducting layer to form a lower electrode on each first sidewall and adjacent portion of the major planar surface;

depositing a first dielectric layer on the lower electrode and the substrate;

depositing and patterning a sacrificial layer on the first sidewall first dielectric layer;

depositing a second dielectric layer on the sacrificial layer and first dielectric layer;

depositing a second conducting layer on the second dielectric layer;

patterning the second conducting layer to form an upper electrode over each lower electrode;

depositing a third dielectric layer on the upper electrode and the second dielectric layer;

depositing a reflecting layer on the first and second sidewall third dielectric layer;

forming a hole through the second and third dielectric layers to expose a portion of the sacrificial layer; and

removing the sacrificial layer to form a dynamic optical face being deflectable between a first position and a second position and a portion of the dynamic optical face being spaced away from the first dielectric layer a first distance in the second position;

wherein, the dynamic optical face in the first position redirects more light back to a light source than the dynamic optical face in the second position.

15. The method according to claim 14, further comprising the step of applying a voltage between the lower electrode and upper electrode reducing the first distance until the dynamic optical face is in the first position.

16. The method according to claim 14, wherein the step of removing the sacrificial layer to form a dynamic optical face being deflectable comprises removing the sacrificial layer to form a dynamic optical face where substantially the entire dynamic optical face deflects between the first position and the second position.

17. The method according to claim 14, wherein the step of depositing a first conducting layer on a substrate having a generally planar major surface and a plurality of cavities on the planar major surface comprises depositing a first conducting layer on a substrate having a generally planar major surface and a plurality of cavities, each cavity having a depth of 10 microns to 100 microns.

18. The method according to claim 14, wherein the step of depositing a first conducting layer on a substrate having a generally planar major surface and a plurality of cavities on the planar major surface comprises depositing a first conducting layer on a substrate having a generally planar major surface and a plurality of cavities, each cavity having a depth of 30 microns to 50 microns.

19. The method according to claim 14, wherein the step of depositing a first conducting layer comprises depositing a first metal layer a thickness of 500 to 1000 angstroms.

20. The method according to claim 14, wherein the step of depositing a second conducting layer comprises depositing a second metal layer a thickness of 500 to 1000 angstroms.

21. The method according to claim 14, wherein the step of depositing a sacrificial layer comprises depositing a sacrificial layer a thickness of 250 to 1000 angstroms.

22. The method according to claim 14, wherein the step of depositing a first conducting layer on a substrate having a generally planar major surface and a plurality of cavities on the planar major surface comprises depositing a first conducting layer on a substrate having a generally planar major surface and a plurality of cube-corner structures in the planar major surface.

23. The method according to claim 14 further comprising the step of depositing an electrically insulating layer on the substrate before depositing the first conducting layer, and then depositing the first conducting layer on the insulating layer.